CLAIMS

1. A separation system for de-entraining liquid particles from an upwardly flowing gaseous stream comprising a de-entrainment zone of vertically spaced, parallel tiers of elongated, U-shaped, liquid collector channels arrayed transversely to the flow of the gaseous stream, each tier having parallel rows of collector channels which are staggered vertically from the rows in the next adjacent tier to deflect the flow of the gaseous stream from a lower tier through gaps between adjacent rows in an upper tier, to separate entrained liquid from the gaseous stream and permit the separated liquid to descend into channels of a lower tier for collection, with a plurality of horizontally-elongated flow deflectors extending parallel to each channel in the region between an upper tier and an adjacent lower tier, in a direction downwards towards a channel of the lower tier.

2. A separation system according to Claim 1 in which the total area of the gaps between the channels of the tier is less than the total area of the tier.

3. A separation system according to Claim 3 in which the total area of the gaps between the channels of the tier is from 35 to 50 percent of the total area of the tier.

4. A separation system according to claim 1 in which the tiers are disposed at an angle no more than 10 percent from the horizontal.

5. A separation system according to claim 1 in which each flow deflector is attached to a bottom portion of a channel of the upper tier.

6. A separation system according to Claim 5 in which each flow deflector is attached at the side of a bottom portion of a channel of the upper tier.

7. A separation system according to claim 6 in which the channels of the lower tier have foraminous extensions in the region between the upper tier and the

lower tier, and the channels of an upper tier have downwardly extending deflectors attached to their bottom portions.

8. A separation system according to claim 6 in which the channels of an upper tier have foraminous extensions in the region above the upper tier, to which downwardly extending deflectors are attached.

9. A separation system according to claim 1 in which the flow deflectors are attached to the channels of the lower tier.

10. A separation system according to claim 9 in which the channels of the lower tier have foraminous extensions in the region between the upper tier and the lower tier, to which the deflectors are fixed.

11. A multi-tray distillation unit having at least one contact tray for contacting a gaseous stream flowing upwardly in the unit with liquid passing downwardly through the unit and at least one separator for de-entraining liquid particles from the gaseous stream after passing through liquid on the contact plate, the separator comprising vertically spaced, parallel tiers of elongated, U-shaped, liquid collector channels arrayed transversely to the flow of the gaseous stream, each tier having parallel rows of collector channels which are staggered vertically from the rows in the next adjacent tier to deflect the flow of the gaseous stream from a lower tier through gaps between adjacent rows in an upper tier, to separate entrained liquid from the gaseous stream and permit the separated liquid to descend into channels of a lower tier for collection, each upper tier channel having at least one rigidly-mounted, horizontally-elongated flow deflector extending downward from the upper tier channel towards a lower tier channel below the deflector.

12. The distillation unit of claim 11 which comprises a plurality of superimposed separators.

13. The distillation unit of claim 11 in which each flow deflector is attached at the side of a bottom portion of a channel of the upper tier.

14. The distillation unit of claim 13 in which the channels of the lower tier have foraminous extensions in the region between the upper tier and the lower tier, and the channels of an upper tier have downwardly extending deflectors attached to their bottom portions.

15. The distillation unit of claim 13 in which the channels of an upper tier have foraminous extensions in the region above the upper tier, to which downwardly extending deflectors are attached.

16. The distillation unit of claim 11 in which the flow deflectors are attached to the channels of the lower tier.

17. The distillation unit of claim 11 which includes a liquid downcomer into which the channels have outlets for collected, separated liquid and which has an outlet for the collected liquid through a liquid seal onto a contact plate.

18. The distillation unit of claim 17 in which the liquid downcomer has a liquid outlet at a contact plate below the level of the plate at which the entrainment has taken place.

19. A method for de-entraining liquid particles from an upwardly flowing gaseous stream, which comprises passing the gaseous stream through a de-entrainment zone of vertically spaced, parallel tiers of elongated, U-shaped, liquid collector channels arrayed transversely to the flow of the gaseous stream, the rows of each tier of collector channels being staggered vertically from the rows in the next adjacent tier to deflect the flow of the gaseous stream from a lower tier through gaps between adjacent rows in an upper tier, each upper tier channel having at least one rigidly-mounted, horizontally-elongated flow deflector extending downward from the upper tier channel towards a lower tier channel below the deflector, separating entrained liquid from the gaseous stream and permitting the separated liquid to descend into channels of a lower tier, collecting separated liquid in the channels of at least

one lower tier, and returning collected, separated liquid to the level of a lower contact plate.

20. The method of claim 19 in which the contact plate to which the collected, separated liquid is returned is at a level below the contact plate at which the entrainment has taken place.